

In the claims:

1. (Original) A method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits, comprising:
preparing an inter-level dielectric substrate;
depositing a layer of Ru on the inter-level dielectric substrate;
depositing a layer of RuO₂ as a diffusion stuffer on the Ru layer; and
depositing copper on the RuO₂ layer.
2. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 1, further comprising depositing multiple layers of Ru and RuO₂ between the inter-level dielectric substrate and the copper layer.
3. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 2, further comprising depositing the RuO₂ layer(s) on the Ru layer(s) using an atomic layer deposition technique.
4. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 2, further comprising depositing the RuO₂ layer(s) on the Ru layer(s) using a thermal oxidation technique.
5. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 2, further comprising depositing the RuO₂ layer(s) on the Ru layer(s) using an electrochemical technique.
6. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 2,

further comprising depositing the RuO₂ layer(s) on the Ru layer(s) using physical vapor deposition.

7. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 1, further comprising depositing the RuO₂ layer on the Ru layer using an atomic layer deposition technique.

8. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 1, further comprising depositing the RuO₂ layer on the Ru layer using a thermal oxidation technique.

9. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 1, further comprising depositing the RuO₂ layer on the Ru layer using an electrochemical technique.

10. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 1, further comprising depositing the RuO₂ layer on the Ru layer using physical vapor deposition.

11. Cancelled.

12. Cancelled.

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15. Cancelled.

16. Cancelled.

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18. Cancelled.

19. Cancelled.

20. Cancelled.

21. Cancelled.

22. Cancelled.

23. Cancelled.

24. Cancelled.

25. (Original) A method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits, comprising:
preparing an inter-level dielectric substrate;
depositing one or a plurality of layers of RuO₂ on the inter-level dielectric substrate; and
depositing copper on the RuO₂ layer.

26. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits of Claim 25, further comprising depositing the RuO₂ layer on the inter-level dielectric using an atomic layer technique.

27. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during fabrication of integrated circuits of Claim 25, further comprising depositing the RuO₂ layer on the inter-level dielectric using an electrochemical technique.

28. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during fabrication of integrated circuits of Claim 25, further comprising depositing the RuO₂ layer on the inter-level dielectric using a thermal oxidation technique.

29. (Original) The method of controlling and containing copper diffusion during the integration of copper interconnects during fabrication of integrated circuits of Claim 25, further comprising depositing the RuO₂ layer on the inter-level dielectric using a physical vapor technique.

30. Cancelled.

31. (Original) A method of controlling copper diffusion during the integration of copper interconnects during integrated circuit fabrication, comprising using Ru as a diffusion barrier.

32. (Original) The method of controlling copper diffusion during the integration of copper interconnects during integrated circuit fabrication of Claim 31, further comprising eliminating a copper seed layer.

33. (Original) A method of controlling copper diffusion during the integration of copper interconnects during integrated circuit fabrication, comprising using Ru and RuO₂ as a diffusion barrier.

34. (Original) The method of controlling copper diffusion during the integration of copper interconnects during integrated circuit fabrication of Claim 33, further comprising eliminating a copper seed layer.

35. Cancelled.

36. Cancelled.

37. Cancelled.

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41. Cancelled.

42. Cancelled.

43. Cancelled.

44. Cancelled.

45. Cancelled.

46. Cancelled.

47. (New) A method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits, comprising:
 preparing an inter-level dielectric substrate;
 depositing a layer of RuO₂ as a diffusion stuffer on the inter-level dielectric substrate;
 depositing a layer of Ru on the RuO₂ layer; and
 depositing copper on the Ru layer,
 wherein the method eliminates the need for a copper seed layer.

48. (New) A method of controlling and containing copper diffusion during the integration of copper interconnects during the fabrication of integrated circuits, comprising:
 preparing an inter-level dielectric substrate;

depositing one or a plurality of layers of RuO₂ or Ru or a combination thereof on
the inter-level dielectric substrate; and
depositing copper on the layer of RuO₂ or Ru or a combination thereof,
wherein the method eliminates the need for a copper seed layer.